Los Alamos National Laboratory **Environmental Restoration Program** Standard Operating Procedure	No: LANL-ER-SOP-09.01 Rev: 0

Thin Section Preparation

	(Print Name)	(Signature)	(Date)
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THIN SECTION PREPARATION

1.0 PURPOSE

The purpose of this procedure is to document the process for the preparation of thin sections from rock samples. Thin sections are used for geological analysis on the microprobe, various microscopes, and for other geological analysis.

2.0 SCOPE

2.1 Applicability

This procedure covers any geologic thin sections prepared in Earth and Environmental Sciences (EES) Division for the Environmental Restoration program, and it is applicable to all personnel who prepare these sections.

2.2 Training

Any person producing thin sections must receive on-the-job training and must be skilled enough to produce thin sections that are acceptable for the intended use.

3.0 DEFINITIONS

A. Thin sections: For the purpose of this procedure, the term thin section will refer to standard petrographic thin sections, as well as grain mounts and fluid inclusion slides.

4.0 BACKGROUND AND/OR CAUTIONS

Preparation of thin sections requires a fine level of skill which cannot be completely described. Also, even a competent preparer may not always produce useable results. Therefore, the final determination of the quality of a thin section must be made by the requestor who decides if the thin section is suitable for the end use.

Of critical importance to this procedure is the accurate transference of sample identification to the thin sections. Samples are to be locked up during non-working hours. Also, all samples must be in locked storage when they are not being used. After thin sections are produced, the thin sections and all remaining sample material are to be returned to the requestor.

Be sure to refer to the appropriate Material Safety Data Sheet (MSDS) when working with the chemicals listed in Section 5.0, Equipment.

5.0 EQUIPMENT

See Attachment A, Equipment and Supplies Checklist, for a list of equipment required for this procedure.

6.0 PROCEDURE

A. The requestor submits samples for thin section preparation by completing the thin section request form (Attachment B). The request is entered into the thin-section laboratory log book.

B. Set samples (pre-numbered in ink) on the table in rows. Mark the sample number in an aluminum dish and on a bag. Use extreme care to mark the sample ID correctly. Set the bag under the rock and place the aluminum dish upside down on top of the rock. Do this for every rock sitting on the table.

C. At this point it must be decided if the sample needs to be impregnated to aid in its slabbing. This is a subjective decision made by the technician. If not, go on to D.

1. If the sample needs to be stabilized by impregnation, place it on top of a cookie sheet covered with aluminum foil.

2. Paint the surface of the rock completely with epon 815-diethylene triamine. Make sure the sample ID is still clearly legible. If not, write the ID in lead pencil on a piece of paper and attach the paper to the epoxy surface.

3. Allow the epoxy to cure before proceeding (24 hours at room temperature, 30-45 minutes in the oven).

D. Use appropriate slabbing saw to cut a slab 3/8 to 1/2 in. thick. Set the slab on top of the corresponding aluminum dish and put the excess material in the bag that has been pre-numbered. At this point, refer to the worksheet to determine whether to core each sample with the diamond core or cut them to chip size with the diamond saw. Use a round or rectangular slide to find the best area on the sample for the thin section. Trace around the pattern with a marking pen. Thin-sections are prepared in accordance with commonly accepted practices, such as those described in the reference.

7.0 REFERENCES

Logitech Machine System's Technology Manual for Thin Rock Section Production, 20 pp.

8.0 RECORDS

The records produced by this procedure are completed Thin Section Request Forms and entries into the Thin Section Laboratory Logbook.

9.0 ATTACHMENTS

A. Equipment and Supplies Checklist for Preparation of Thin Sections

B. Thin Section Request Form.

EQUIPMENT AND SUPPLIES CHECKLIST FOR PREPARATION OF THIN SECTIONS

Small supplies:

_____ Aluminum dishes

_____ Sample bags

_____ Cookie sheet

_____ Aluminum foil

_____ Round or rectangular slides

_____ Indelible marking pen

_____ Typewriter correction fluid

_____ Lead pencil with eraser

_____ 12" Forceps

_____ One 40-ml beaker, two 600-ml beakers, and two 150-ml beakers

_____ Pliers

_____ Glass stir rod

_____ Clean wipes

_____ Tongs

_____ Dial-caliper

_____ Probe or pick

_____ Razor blade

_____ Large tweezers

_____ "600" Glass plate

_____ Staining dish

EQUIPMENT AND SUPPLIES CHECKLIST FOR THIN SECTION PREPARATION (Continued)

_____ Rubber suction cup bent at 90 degree angle

_____ Back drop mounting plate

_____ Microscope cover glass (or cover slips)

_____ 1-inch round ring mold.

Large Equipment:

_____ Slabbing saw

_____ 8" or 10" diamond saw

_____ Diamond core drill press

_____ Oven

_____ Vacuum Chamber

_____ High- and low-speed lap with 100 mesh plate and 1, 3, 6, 30, 40, and 45 micron plates

_____ Hot plate

_____ Logitech (LP 30) with 1/4-inch rubber and 1-inch thick piece of foam

_____ Dial-o-gram balance with disposo weigh boat

_____ Ultrasonic cleaner

_____ Air blower

_____ Electric engraver

_____ Ingram thin-section cutoff saw

_____ Ingram grinder

_____ Petrographic microscope

_____ Dust chaser.

EQUIPMENT AND SUPPLIES CHECKLIST FOR THIN SECTION PREPARATION (Concluded)

Chemicals:

_____ Epon 815-diethylene triamine

_____ Shell epoxy

_____ Buehler epoxy

_____ Aluminum oxide (1200 grit)

_____ Kerosene

_____ Pella oil

_____ Silicone carbide (600 grit)

_____ Isopropyl or ethyl 190 alcohol

_____ Distilled water

_____ Sodium-cobaltinitrite powder

_____ Isopropanol

_____ Hydrofluoric acid

_____ Tap water

_____ Barium chloride

_____ Methanol (MeOH)

_____ Amaranth powder

_____ Diamond paste (1, 3, and 6 micron)

_____ 6 micron diamond spray

_____ Diamond Polishing Extender (mixture of propolenegycol and isopropanol)

_____ Duro Super Glue.

THIN SECTION REQUEST FORM

LOS ALAMOS NATIONAL LABORATORY
ENVIRONMENTAL RESTORATION
THIN SECTION REQUEST FORM

Sheet _____ of _____

Site Work Plan _____

Technical Area _____

Inclusive Sample Identifiers:

Operable Unit _____

_____ to _____

Signature: _____ Date: _____

Date Submitted _____

Priority (check one):
_____ 1 Day
_____ 3 Days
_____ 2 Weeks
_____ Space Available

Number of Samples _____

I. TYPE OF MOUNT (check one):

___ Glass Rectangular ___ Glass Round ___ Epoxy Casting
___ Silica Rectangular ___ Silica Round ___ Probe Standard

II. THICKNESS REQUIRED (check one):

___ Unlimited ___ 150 µ ___ 30 µ

III. POLISHING REQUIRED (check one):

_____ None, _____ Polished on Bottom Side, _____ Polished on Top Side, _____ Polished on Both Sides

IV. SPECIAL INSTRUCTIONS

_____

_____

_____

V. SAMPLE NUMBER

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

SAMPLE LOG SHEET

Samples received in Sample Prep Lab _____ _____
Signature Date

Samples distributed to _____ _____
Signature Date

❑ CHECK HERE IF INFORMATION IS RECORDED ON BACK OF FORM

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